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## ARTICLE XXIII.

*A Memoir on the extinct Dicotylinæ of America. By Joseph Leidy, M. D. Read May 21, 1852.*

The genus *Dicotyles*, so far as our knowledge extends, appears always to have replaced the genus *Sus* upon the American continent.

The two existing species of *Dicotyles* inhabit all the tropical parts of America, and even extend into Texas. The larger is the *D. labiatus*, the other the *D. torquatus*.

I have not been able to find any authority who gives the distinct osteological characters of the head of the two species except Dr. Rengger in his *Naturgeschichte der Säugetiere von Paraguay*, p. 329.

De Blainville in his *Osteographie*, Article *Sus*, has given three views, in Plate V., of the skull of *D. labiatus*, which he has named *D. torquatus*, although he has represented an undoubted entire skeleton of the latter in Plate III.

The differences observed between a specimen of the head of *D. labiatus* and five specimens of the head of *D. torquatus*, preserved in the collection of the Academy of Natural Sciences, are as follow:

The narrow portion of the cranium, produced by the approach above of the temporal fossæ, is not only relatively but absolutely longer in *D. torquatus* than in *D. labiatus*.

The lower portion of the face is relatively broader in the latter, produced by a prominence commencing on the inner side of the infra-orbital foramen advancing and gradually increasing to the canine alveolus. The prominence slopes outwards from its upper part to its lower margin where it ceases abruptly, and overhangs the anterior premolar alveoli and the edge of the hiatus in advance of the latter, so as to conceal them in viewing the skull from above. It encroaches on the transverse diameter of the infra-orbital foramen, and thus gives it a semi-oval form. It is hollow, and accommodates a large portion of the inferior scroll of the turbinated bone. In *D. torquatus* the prominence does not exist, and its position is occupied by a concavity proceeding from the infra-orbital foramen, which in this species is oval. Moreover, the latter foramen in *D. torquatus* is above the third premolar, while in the other species it is above the first true molar.

The upper part of the face is broad, and relatively moderately convex, in *D. labiatus*, but narrow and strongly arched in *D. torquatus*. In the direction of the length of the ossa nasi in the latter it is slightly convex, but in the former in the same direction slightly concave.

The anterior free extremity of the nasal bones in *D. labiatus* is relatively long and subacute; short and convex in *D. torquatus*.

The external face of the malar bone below the orbit in the latter species is more depressed than in the other, and its infero-external margin forms an acute ridge, continuous upon the superior maxillary bone, shelving outwards from above, advancing obliquely over the infra-orbital foramen, and disappearing in a slight prominence in a position corresponding to the bottom of the canine alveolus. The face, below this ridge to the alveolar margin, is concave. In *D. labiatus* the ridge of the maxillary bone, corresponding to the inferior margin of the malar bone, curves much more upwards than in *D. torquatus*, and ceases a very considerable distance posterior to its termination in the latter species. Beneath and within this ridge, the face is more deeply and vertically depressed than in *D. torquatus*.

The face, just in advance of the orbits, is less nearly vertical in the latter than in *D. labiatus*.

In the lower jaw the most striking difference between the two species is the strong bend inwards of the angle in *D. torquatus*, and its nearly vertical condition in *D. labiatus*.

Remains of extinct species of *Dicotylinæ* are frequent upon the American continent.

Lund first announced the existence of such remains in the *Danske videnskab. Selskabs naturvid. Afhandl.* volumes 8 and 9, for 1841–2. He observes they are often found in numerous caves of Brazil, and in the tables accompanying his memoirs enumerates five extinct species of *Dicotyles*, but does not describe the specimens upon which they are established.

In Brönn's *Index Palæontologicus*, part first, p. 422, is given the name *Dicotyles major*, *Lund*, as described by Clausen in the *Neues Jahrbuch für Mineralogie, etc.*, 1843, but to this work I have not had access.

In the *American Journal of Science* for 1848,\* Dr. J. L. Le Conte published an account of a collection of mammalian remains found in the lead region of Illinois. Most of the remains are referrible to *Dycotylinæ*, of which the author proposed three new species and genera: *Platygonus compressus*, *Hyops depressifrons*, and *Protochœrus prismaticus*. The former of these Dr. Le Conte afterwards described in detail in the *Memoirs of the American Academy of Science and Arts* for 1848.†

Subsequently, in the *Proceedings of the Academy of Natural Sciences* for 1852,‡ the fragments upon which was proposed *Hyops depressifrons* were referred to the genus *Dicotyles*, and a few additional remarks given upon *Protochœrus prismaticus*.§

\* New series, vol. v. p. 102: Notice of five new species of Fossil Mammalia from Illinois.

† New series, vol. iii., p. 257: On *Platygonus compressus*: a new fossil Pachyderm.

‡ Vol. vi. p. 3.

§ Ibid. p. 5.

In the same work\* Dr. Le Conte notices a fossil *Dicotyles* from Benton county, Missouri, found in association with bones of the Mastodon, for which the name *Dicotyles costatus* is proposed.

My friend Le Conte, with his usual liberality, has presented to the Academy of Natural Sciences the specimens upon which the species and genera just mentioned have been founded. Of these, I propose to examine in the succeeding pages only the more characteristic; not only for the purpose of determining as far as possible the distinct species and genera they indicate, which alone is a subject of greater importance to Palæontology than the unriddling to which animal every fragment belongs, but more particularly for the sake of comparison with an almost perfect head of an extinct animal, found in a saltpetre cave in Kentucky, belonging to the American Philosophical Society, and deposited by this body, in its desire to advance the interests of Science, in the Cabinet of the Academy of Natural Sciences.

The specimens of Dr. Le Conte's collection are very imperfect, brittle, and mutilated, and their investigation has by no means proved an easy one, nor have the results turned out so satisfactory as are desirable.

The most characteristic fossil, for which the name *Platygonus* without doubt must be retained, is the fragment of lower jaw presenting the peculiarity from which the animal derives its name.

The specimen consists of the hinder portion of the right half of the lower jaw of a middle-aged adult. It is much broken, and contains the two posterior molars, also broken, and fragments of the two in advance, (Pl. 38, Fig. 3.) Accompanying the specimen, and apparently belonging to the same individual, are the crowns of the posterior two true molars and premolars of the left side, and the last true molar and the inner lobes of the second, and the three premolars of the right side, of the upper jaw.

The fragment of lower jaw, (Pl. 38, Fig. 3,) is relatively deeper than in *Dicotyles*, and the angle is not only directed more downwards but it curves very much outwards. (Pl. 37, Fig. 9.) The condyle, broken at its inner side, has its articular surface a little more convex than in *Dicotyles*, and externally is not so prominent, and exhibits a small depression for the attachment of the external lateral ligament. The coronoid process is broken away. The fossa posterior to the latter process has the same form as in *Dicotyles*, but is relatively deeper.

The two teeth preserved in the specimen (Pl. 37, fig. 10,) are considerably worn, the dentine being exposed in lobate patches upon all the dental lobes, except the posterior and the internal of the middle pair of the last molar. These teeth are intermediate in size to those of the two existing species of *Dicotyles*, and are constructed on the same type, but their triturating surfaces have none of the wrinkled appearance existing in *Dicotyles* and reaching its excess in *Sus*, and the principal lobes are more prominently developed and relatively much longer, and the lesser or accessory lobes of *Dicotyles* disappear or exist only as continuous portions of the principal lobes. From trituration the principal lobes of the teeth in the fossil have become combined into transverse pyramidal

ridges, separated by deep angular transverse valleys, causing the teeth to assume a remarkably taperoid appearance, and indicating a movement in the lower jaw of *Platygonus*, less rotary and more simply ginglymoid than exists in *Dicotyles*; for at the same stage of trituration of the teeth in the latter, the principal lobes would be worn down to a level with the bottom of the interlobular fissures, approaching more in this respect the Hog than the Tapir. In the last molar, the fifth or posterior lobe, broken in the specimen, is simple, and demiconoidal or flattened before and convex behind. Between it and the internal of the second pair of lobes, is a slight tubercle, a constituent portion of the basal ridge.

In neither teeth of the specimen do constituent portions of the basal ridge exist internally between the lobes, but externally, portions unite the bases of the latter.

The upper true molars (Pl. 37, fig. 13,) present the same striking peculiarities which distinguish them from *Dicotyles*, as the lower ones; that is to say, the principal lobes are very robust and prominent, the accessory lobes have disappeared, and the former and the basal ridge are unwrinkled.

These teeth are quadrate, constricted at the middle laterally, have convex sides, and are surrounded by a basal ridge open at the bases internally of the inner lobes. The latter are trilobate as in *Hippopotamus*, or expand before and behind, where they come in contact with the outer lobes, which are simply conoidal. In the specimens, the expansions just mentioned are worn away, leaving the transverse pairs of principal lobes associated as prominent pyramidal ridges, separated by deep and wide transverse valleys, as in the case of the corresponding teeth of the lower jaw.

The basal ridge is best developed anteriorly and posteriorly, and though worn smooth to some degree, yet appears never to have been so wrinkled or tuberculated and foveated as in the Peccary. In the last molar posteriorly, it is prominently convex, and at the middle rises in a simple short accessory tubercle associated with the postero-internal lobe.

The second and third premolars (Pl. 37, fig. 12,) are like one half of the true molars. They are quadrate, with rounded sides and angles, and narrowest and most convex internally, and have a single transverse pair of lobes like those of the true molars, surrounded by a cingulum open for a short space internally and externally at the bases of the corresponding lobes. The cingulum or basal ridge is nearly twice as thick posteriorly as anteriorly.

The crown of the first premolar (Pl. 37, fig. 12,) is trilateral, with rounded angles, and the apex forwards, and consists of a single conical lobe, surrounded at its inner four-fifths by a strong basal ridge best developed posteriorly.

Found in the same crevice with the specimens just described, was a fragment of the face of a young animal containing upon the left side the three permanent premolars, which had not yet protruded, the fangs of the canines, and a single lateral incisor. (Pl. 38, fig. 2.) This specimen Dr. Le Conte referred to *Platygonus compressus* in his memoir on the latter, but subsequently, from comparison with the cave head alluded to, was led to suspect it belonged to *Dicotyles depressifrons*.\* From more prolonged compa-

\* Pr. Acad. Nat. Sci., vi. 57.

rison, however, I am inclined to believe Dr. Le Conte was right in referring it to *Platygonus compressus*, for the form of the fragment of face is very different from the corresponding portion of that specimen upon which *Dicotyles depressifrons* was characterized. And further, the premolars contained in the fragment (Pl. 37, fig. 11,) have the same form and size as those just described, (Pl. 37, fig. 12,) which with very little doubt belonged to the same individual as the fragment of lower jaw characteristic of *Platygonus*. In both, the first premolar possesses but a single conical lobe, which is a very different condition of the tooth as it exists in *Dicotyles*, or the cave head hereafter to be described.

The fragment of a face under consideration, which most probably belongs to *Platygonus compressus*, is constituted by portions of the superior maxillary bones, the right intermaxillary bone and a portion of the right nasal bone. It appears narrower or more compressed laterally than in *Dicotyles torquatus*, arising principally from the absence of the ridge so conspicuous in the latter proceeding from the inferior margin of the malar bone.

The nasal bone is a little less convex transversely than in *Dicotyles torquatus*, but is about as much so longitudinally.

The crescentic ridge of the canine alveolus rises higher relatively than in *Dicotyles*, and in its course forwards runs into the margin of the nares. The intermaxillary bone appears to be unusually long, its upper end being over three inches posterior to the summit of the canine alveolar ridge. Its lateral surface at the upper extremity presents directly outwards, but at the lower half inclines at an angle of about 50°. The upper part of the superior maxillary bone about three inches posterior to the canine alveolar ridge, is protuberant, but presents no indication of possessing the acute ridge proceeding from the malar bone and characteristic of *Dicotyles*. The permanent premolars (Pl. 37, fig. 11,) preserved in the specimen from being unworn, exhibit better their characters in detail than those described. As before mentioned, they have the same size and form of those just alluded to. Their basal ridge is tuberculate and foveate. The principal lobes in the hinder two premolars are confluent at the middle of their basal two-thirds.

The hiatus between the first premolar and the canines, is about one and three quarter inches. The canines have about the same degree of divergence from each other as in *Dicotyles*, but they appear to project a little more forward.

A detached upper canine tooth (Pl. 37, fig. 16,) undoubtedly belonging to the same species, and having the crown perfect and but little worn, exhibits the same form, and about the same degree of lateral compression as in *Dicotyles torquatus*.

The hiatus between the anterior margin of the canine and the lateral incisor is about ten lines.

The latter tooth in the specimen is one of the permanent incisors, and it had not yet entirely protruded. Its crown is but little more than half the size of that of *D. torquatus*, and its form is more simple; being short and slightly compressed mammillary, with the apex impressed by an O shaped disk, with a slightly prominent tubercle in its centre. It is convex both anteriorly and posteriorly; in the latter position, being concave in *Dicotyles*.

In Dr. Le Conte's collection there is a second premolar, (Pl. 37, fig. 14,) and the first and second true molars, (fig. 15,) of the superior left side, which have been referred to *Dicotyles depressifrons*,\* but which correspond so closely in size and form with the teeth described of *Platygonus*, that I think they belonged to another and younger individual only of the latter.

## ADMEASUREMENTS OF PLATYGONUS.

*Fragment of Lower Jaw.*

|   |   |   |   |   |          |                   |
|---|---|---|---|---|----------|-------------------|
| Height from angle to condyle,             | - | - | - | - | 3 inches | 9 lines.          |
| do of body below last molar,              | - | - | - | - | 1 "      | 11 "              |
| Ant. post. diameter of last molar,        | - | - | - | - | "        | 10 "              |
| Transverse do do                          | - | - | - | - | "        | 5 $\frac{3}{4}$ " |
| Ant. post. diameter of second true molar, | - | - | - | - | "        | 7 $\frac{1}{2}$ " |
| Transverse, do do do                      | - | - | - | - | "        | 5 $\frac{1}{2}$ " |

*Isolated Upper Molars.*

|                            |   |   |   |   |                        |                        |
|----------------------------|---|---|---|---|------------------------|------------------------|
| Length of premolar series, | - | - | - | - | 1 inch                 | 2 lines.               |
| Diameter, first premolar,  | - | - | - | - | Ant. post.             | Trans.                 |
| do second do               | - | - | - | - | 4 $\frac{1}{2}$ lines. | 3 $\frac{3}{4}$ lines. |
| do third do                | - | - | - | - | 4 $\frac{1}{2}$ "      | 5 "                    |
| do first true molar,       | - | - | - | - | 5 "                    | 5 $\frac{3}{4}$ "      |
| do second do               | - | - | - | - | 6 "                    | 5 $\frac{3}{4}$ "      |
| do third do                | - | - | - | - | 7 $\frac{1}{2}$ "      | 6 $\frac{3}{4}$ "      |
|                            |   |   |   |   | 9 "                    | 7 $\frac{1}{2}$ "      |

*Fragment of Face.*

|   |   |   |   |   |        |                   |
|---|---|---|---|---|--------|-------------------|
| Height of crescentic ridge of canine alveolus,  | - | - | - | - | 1 inch | 3 lines.          |
| Distance from summit of the latter ridge to the upper end of the intermaxillary bone, | - | - | - | - | 3 "    | 4 "               |
| Narrowest part of face below the upper extremities of the intermaxillaries,           | - | - | - | - | 1 "    | 2 "               |
| Breadth of each os nasi about middle,   | - | - | - | - | -      | 6 "               |
| Height of face about one inch in advance of the molars,                               | - | - | - | - | 2 "    | 2 "               |
| Length of line of permanent premolars,  | - | - | - | - | 1 "    | 1 "               |
| Transverse diameter of first premolar,  | - | - | - | - | -      | 4 "               |
| Ant. post. do second do   | - | - | - | - | -      | 4 $\frac{1}{2}$ " |
| Transverse, do do do  | - | - | - | - | -      | 5 "               |
| Ant. post. do third do  | - | - | - | - | -      | 4 $\frac{3}{4}$ " |
| Transverse do do do   | - | - | - | - | -      | 5 $\frac{3}{4}$ " |

*Isolated Superior Canine.*

|                                       |   |   |   |   |                   |          |
|---------------------------------------|---|---|---|---|-------------------|----------|
| Length of enamelled crown internally, | - | - | - | - | 1 inch,           | 7 lines. |
| Antero-posterior diameter at base,    | - | - | - | - | 6 "               |          |
| Transverse do do                      | - | - | - | - | 3 $\frac{1}{2}$ " |          |

*Other fragments, probably belonging to Platygonus compressus, and presented to the Academy by Dr. Le Conte. These are as follow:—*

1. Fragments of the forehead, (Mem. Am. Acad. Arts and Sci., vol. 3, plate 2, fig. 4,) indicating the breadth at the post orbital processes to be three and a quarter inches.
2. Several fragments of an os malæ and hard palate.
3. Bodies of a dorsal and lumbar vertebra, (Ib., plate 3, fig. 14; plate 4, figs. 16–18.)
4. Portion of os innominatum.

\* Pr. A. N. S., vi. 3.

5. Lower part of both ossa humeri (Ib., plate 4, fig. 21,) of the right side.
6. Bone of fore arm, (Ib., plate 4, fig. 21.)
7. A right metacarpal, without the distal epiphysis, (Ib., figs. 23, 24.)
8. Two astragali: diameter from the bottom of the tibial to the distal trochlea fourteen lines; transverse diameter at middle eight lines.
9. Fragment of an os calcis.

The most important specimen, upon which the genus *Hyops* was proposed, consists of the upper portion of a cranium and face much fractured, (Pl. 38, Fig. 1). The size of the fragment is such as to indicate the existence of an animal a little larger than the *Dicotyles labiatus*, but possessing relatively a little shorter and broader forehead, and a longer and broader, but shallower face. The lateral margins of the forehead and the upper part of the inion are broken away, but it appears as if the length of the former had a little exceeded its breadth. The forehead is also a little more depressed on each side.

The face slopes from the position of the orbito-frontal foramina more abruptly downwards and forwards than in *Dicotyles*, and after two inches of its course rather abruptly ceases to incline so much downwards. That portion of the ossa nasi posteriorly and outside of the groove leading from the orbito-frontal foramina is prominently convex, and on a level with their median line. The fronto-nasal suture forms the outline of a depressed cone with rounded apex, two and a half inches wide at base, and thirteen lines in depth. Anteriorly the ossa nasi are about as convex transversely as in *D. labiatus*.

The orbito-frontal foramina are thirteen lines apart. The upper extremity of the ossa inter-maxillaria, alone preserved in the specimen, inclines at an angle only of about  $35^{\circ}$ , and the distance of its point from the suture connecting the nasal process of the superior maxillary bone with the os frontis, is two inches one and a half lines. The nasal process of the superior maxillary bone slopes from the ossa nasi laterally at an angle of about  $35^{\circ}$ .

A prominent acute ridge appears to have existed at the side of the superior maxillary bones, proceeding forwards from the inferior margin of the malar bone in the existing species of *Dicotyles*, and more especially like that in *D. labiatus*, but the specimen is too much mutilated to determine its exact extent and character.

The anterior extremity of the malar bone is broad, not more depressed than in *D. labiatus*, and inclines at about the same angle as the contiguous portion of the superior maxillary bone.

The fractured condition of the specimen permits the extensive sinuses to be seen which every where occupy a position between the tables of the cranial bones, and communicate freely with the ethmoidal and nasal sinuses.

From what has been stated in regard to this fragment, it will have been perceived not to possess a single character which would separate the animal from the genus *Dicotyles*, to which Dr. Le Conte considered it belonging, subsequently\* to its being first ascribed to *Hyops*.

\* Pr. A. N. S., vi. 3.

*Admeasurements of the Fragment of Cranium of Dicotyles depressifrons.*

|  |   |   |   |   |                    |
|--|---|---|---|---|--------------------|
| Length of os frontis,                                    | - | - | - | - | 2 inches, 9 lines. |
| Estimated length from inion to ossa nasi,                | - | - | - | 4 | " 6 "              |
| Distance between orbito-frontal foramina,                | - | - | - | 1 | " 1 "              |
| Breadth of ossa nasi at angular processes of os frontis, | - | - | - | 2 | " 2 "              |
| Breadth of ossa nasi at upper end of intermaxillaries,   | - | - | - | 1 | " 4½ "             |
| Distance from latter to angular processes of os frontis, | - | - | - | 2 | " 2 "              |

In company with the fragment of cranium just described as expressive of *Dicotyles depressifrons*, there also was found a fragment of the left side of the lower jaw containing a portion of the corresponding canine tooth, and the distal extremity of a left canine possibly belonging to the same individual as the former.

The specimens indicate a larger species than those recent, and both belonged to an old individual.

The fragment of jaw along the course of the canine alveolus externally is very convex, and just posterior to the symphysis is ten lines thick, and from the base to the edge of the hiatus, a little posterior to the position of the mental foramen, measures fifteen and a half lines. The portion of the fang of the canine remaining in the alveolus at its broken extremity has the dental cavity nearly obliterated. In transverse section the fang of the tooth is quadrilateral, with its longest diameter antero-posterior; anteriorly it is narrowest and convex; externally it presents a projecting longitudinal ridge; posteriorly a longitudinal groove; and internally is convex posteriorly but longitudinally depressed anteriorly.

The distal fragment of tooth presents the same relative proportions and form as the fragment of fang retained in the alveolus. It of course becomes in section trilateral, as in existing species of *Dicotyles*. The end only, of the specimen, which in curve is two and three quarter inches long, has enamel upon it: internally for about one inch, externally for ten lines, and the body of the tooth, with the exception of a remaining portion of the pulp cavity about one-third of a line in diameter, is a solid rod of dentine. The greatest antero-posterior measurement of the fang is eight lines, and that transverse six lines.

*Other fragments probably belonging to Dicotyles depressifrons.*

Some other specimens presented by Dr. Le Conte to the Academy, which may be considered as belonging to *Dicotyles depressifrons*, are as follow:

1. Distal extremity of both ossa humeri: slightly more robust than in *Platygonus*.
2. Left os femoris, like that of *Dicotyles torquatus*, but larger; its length being seven inches and its circumference at the middle of the shaft two inches and a quarter.

Besides these, there are fragments of the second right metacarpal, left os innominatum, and left tibia, also a scaphoid and cuboid,\* and two first phalanges and one second phalanx.

The specimens upon which Dr. Le Conte proposed the *Protochoerus prismaticus*† consist of an inferior canine, and a first true and a portion of a last molar of the right side, most

\* Mem. Am. Acad. Arts and Sciences, vol. 3, pl. iv. fig. 25, 26.

† Am. Journ. Sci., 2d series, vol. V., p. 105; Proc. Acad. Nat. Sci., vol. VI. p. 5.

probably of that above. They were found under circumstances similar to those already described, but in another locality fifteen miles distant.

The three teeth probably belonged to the same individual, which had passed the middle of adult life, as the specimen of the first true molar, which is about the size of that of the collared Peccary, has its characteristic triturating surface nearly obliterated.

The most characteristic specimen is the fragment of the last molar (Pl. 37, fig. 18), which in outline resembles more the lower than the corresponding upper tooth of the Peccary, but its proper position has been rather determined by comparison with the teeth in the cave head. In the robustness of its lobes it approaches more that of *Platygonus* than that of the Peccary, and from their prominent prismoid character the specific name which has been applied to the animal is quite appropriate. Its admeasurements are as follow:

Estimated antero-posterior diameter, - - - - - 10 lines.

Breadth at middle, - - - - - 6 "

The first true molar measures six lines antero-posteriorly, and four and three quarter lines in breadth.

The inferior canine was rather smaller than that of the cave head, and it evidently belonged to an old individual, as the enamelled portion of the crown is worn away to a length of about sixteen lines, while the remaining portion of the fang, about ten lines long, is somewhat gibbous, and is solid, except a pulp canal in the centre about half a line in diameter. In section the fang is oval, but impressed posteriorly. The external and internal faces of the crown are smooth and convex.

It is not possible at present to determine whether the teeth ascribed to *Protochœrus* do not belong to the same animal characterized from a cranial fragment under the name of *Dicotyles depressifrons*. If they should be proved hereafter to do so, then both the teeth and cranial fragment must fall back into the genus *Hyops*, previously proposed to *Protochœrus*, for the posterior molar tooth described of the latter evidently is generically distinct from that of the recent *Dicotyles*.

*Dicotyles costatus* was established by Dr. Le Conte from a fragment of the symphysis of the lower jaw in connexion with the right inferior canine tooth. The specimen was found in Benton county, Missouri, in association with bones of the Mastodon. The tooth is larger than that of *Dicotyles labiatus*, and the anterior margin of the crown is more acute than in any of the specimens of recent *Dicotyles* which have come under my notice. Its inner side is smooth and convex, and its outer side presents a prominent longitudinal ridge, from which the species is named, but which is sometimes even better developed in the *Dicotyles torquatus*.

The specimen probably indicates a species larger than either of those existing.

#### *Admeasurements.*

|   |                       |
|---|-----------------------|
| Greatest breadth at the base of the enamelled crown of the inferior canine, | $5\frac{3}{4}$ lines. |
| Antero-posterior diameter,  | 7 "                   |

On the occasion of the removal of the collection of Mammalian Remains deposited by the American Philosophical Society, in the cabinet of the Academy of Natural Sciences,

I observed an apparently recent skull labelled "Peccary, presented by Dr. Samuel Brown, December, 1805." It struck me as being unusually large, which led me to compare it with the heads of the *Dicotyles torquatus*, and *D. labiatus*, when it proved without doubt to be very distinct from either. But how the head of a third species of existing Peccary should be preserved in the cabinet of our Society for forty-seven years, and the animal be entirely unknown, puzzled me. On examining the minutes of the society for 1805, to find out the locality from whence the specimen was obtained, the mystery was solved. At a meeting of the Philosophical Society, December 20th, 1805, "The bones of the head of a new animal, found in a saltpetre cave, and a specimen of pure native saltpetre, were presented by Dr. Brown of Kentucky." In the course of the same meeting the head was referred to Dr. Wistar for examination, who, at the meeting of January 7th, 1806, reported that the head of what was supposed to be a new animal, presented by Dr. Brown, proved to belong to the Peccary of South America, as described by Daubenton in Buffon's work.

Dr. Harlan refers to this skull in a foot note to page 222 of his *Fauna Americana*, and observes it "certainly belonged to the recent *Peccari*."

The remarkable condition in which the specimen has been preserved no doubt favoured the impression of those who examined it, that it belonged to the recent Peccary. The texture remains entirely unchanged, and it looks as fresh as if prepared but a few years ago, and had become ochreous yellow from being kept out of the influence of light. Within the open fangs of several of the molars I noticed a few small pieces of adhering adipocire. Its state of preservation, however, is not so remarkable as in the case of the bones of the *Megalonyx laqueatus*, *Harlan*, contained in the Cabinet of the Academy of Natural Sciences, and found under similar circumstances: namely, in a cave in Tennessee. These bones not only retain their original texture, but also have attached shreds of fibrous tissue, portions of articular cartilage, and upon one os unguis nearly the entire nail.

With the exception of the greater portion of the ossa nasi, one upper canine, and all the incisors but one inferior lateral, the cave head under consideration is almost perfect, (Pl. 35, 36.)

The animal to which it belonged had not yet reached adult age, although many of the sutures of the skull are nearly obliterated. The summits only of the anterior lobes of the last molars of both jaws have just protruded, and the deciduous molars had not been shed. The latter are preserved on the left side of the upper jaw, but all those of the lower jaw, and of the right side above, except one, are lost.

The general form of the cave head is most like that of the recent Peccary, but differs strikingly in the great relative breadth of the forehead and the more abrupt narrowing and greater degree of prolongation of the face.

The upper part of the occiput in the fossil is relatively broader and shorter than in the Peccary, and the lateral margins, instead of being nearly parallel, as in the latter, form with the summit a semicircle. The infero-lateral portions of the occiput on the same plane with the mastoid portions of the ossa tempora present more outwardly or are more bent forwards. The occipital foramen has the same form as in the Peccary, but the superior margin projects more posteriorly. The condyles have the same relation to the foramen, and the para-mastoid processes the same form and direction.

The top of the cranium or forehead, considered as extending from the inion to the root of the nose, is broader at the post-orbital processes than it is long, but in the Peccary the length greatly exceeds the breadth. It is also more convex antero-posteriorly, but much less so transversely, being nearly flat.

The orbito-frontal foramina and the vasculo-neural grooves leading from them to the side of the face, hold the same position as in the Peccary. From the depression of the forehead the orbit appears more elevated than in the latter: the lachrymal tubercle being only eight lines below the level of the forehead in the fossil, while it is one inch below it in *D. torquatus*.

The temporal fossa has the same form as in the latter, but its surface extends more outwardly in the direction of the post-orbital processes. Its length is absolutely not greater than in *D. torquatus*, but it gains in depth and extent by the increased depth of the zygomatic process.

The malar bone is of extraordinary depth, relatively very much more than in the Peccary. Its outer side is not depressed, as in the latter, but is antero-posteriorly convex, and the inferior margin rises much more upwardly. The masseteric surface of origin, instead of being directed downwards, as in the Peccary, presents more outwards, as in the Hippopotamus, and the acute margin bounding it externally ceases at the maxillary suture, while in the Peccary it is continuous with a highly characteristic prominent, acute ridge of the maxillary bone, advancing anterior to the position of the infra-orbital foramen. The maxillary bone in the fossil, immediately in advance of its conjunction with the malar bone, is elevated into a protuberance upon the same level as the outer surface of the malar bone. The latter rises much higher upon the face than in the Peccary, reducing the nasal process of the superior maxillary bone into a relatively narrow strip, and aiding in the elevation of the orbit anteriorly.

The transverse diameter of the orbit is greater than the vertical and its direction obliquely upwards and forwards, but in the Peccary the former is the shorter diameter and its direction downward and forward.

The face, anterior to the temporal fossa, is relatively very long, compared to that of the Peccary. It is also relatively narrower, principally from the absence of the ridge of the maxillary bone continuous with the malar bone in the latter, which also renders it nearly vertical from the edges of the ossa nasi at its anterior two-thirds.

The central part of the sides of the face, over the position of the infra-orbital foramen, is concave, and is most deeply so just anterior to the latter foramen, which is oval in its form and situated above the interval of the third and fourth molars. The alveoli have a more advanced position in the face than in the Peccary, in which the last molar is on a line with the ant-orbital margin, but in the fossil is placed an inch anterior to it.

The upper part of the face, as constituted by the ossa nasi, is for the most part broken away in the fossil. Its posterior part is broad and only a little convex transversely, while its anterior three-fourths, judging from a small remaining fragment, appears to have been as convex as in *D. torquatus*.

The anterior extremity of the face is more pointed than in the Peccary from the ad-

vancement of the intermaxillaries several lines beyond the alveoli of the central incisors, indicating probably a more prolonged upper lip than in the animal just mentioned.

The basilar process, instead of being nearly horizontal and plane, as in the Peccary, ascends obliquely, is carinated inferiorly, and terminates on each side anteriorly in a relatively very large, prominent tuberosity, serving as an abutment for the post sphenoidal body. Just in advance of the condyles it is depressed on each side into a deep pit for muscular insertion. The ossa tympanica have the same form and construction as in the Peccary. The guttural region exhibits some of the most remarkable features of the cave head.

The post-sphenoidal body in the Peccary ascends at a very obtuse angle from the basilar process, but in the fossil ascends vertically from the line of the palate, and curves forward continuous in the latter direction with the ant-sphenoidal body. The surface of the post-sphenoidal body presents directly forward, and is concave on each side; and that of the ant-sphenoidal body is directed downwards, and is deeply concave upon each side of the azygous process. Compared to the Peccary, a relatively very deep and capacious fossa with concave sides exists in the fossil between the posterior nares and the post-sphenoidal body. It is divided antero-posteriorly by the middle prominence of the latter and the azygous process of the ant-sphenoidal body. Its sides are constituted by the anterior portion of the roots of the external pterygoid processes dilated or bulging outwardly, in conjunction with a lateral expansion of the ant-sphenoidal body where it descends to form the internal pterygoid process. The communication below is trilobate; the corresponding position in the Peccary being cordiform.

The ossa palati early unite with the superior maxillary bones as in the Peccary, so that the transverse palate suture is no more visible. In the Peccary the palate bones where they unite rise posteriorly in the form of a deep angular groove to the inferior edge of the nares, but in the fossil their palate plates are transversely concave, and form between the extremities of the internal pterygoid processes a sharp crescentic edge, between which and the inferior margin of the nares is a remarkable cul-de-sac, divided into two unequal portions by a vertical partition on the left side of the median line. The space in which this cul-de-sac is situated is eleven lines high from the palatal to the narial margin, and the bottom of the sac extends about one-fourth of an inch anterior to the palatal margin.

An enormous cellular dilatation of an oval form apparently protrudes from between the maxillary and palate bones, and extends backwards to the anterior margin of the external pterygoid process. Its interior communicates anteriorly with the cavity of the nose; externally it is convex, and on its inner surface, forming the lateral parietes of the posterior nares, is concave. It is about two inches long, and at the middle about an inch deep, and three-fourths of an inch wide. It appears to be formed by the palate bone, but of this I am not sure, as its sutural connexions are for the most part obliterated. A similar but smaller dilatation exists in *Dicotyles labiatus*, but in the specimen I have under comparison its sutural connexions are also entirely obliterated.

One of the most remarkable characters of the cave head is the excessive cellular dilatation of the bones about the middle of the face. In addition to the larger dilatations just

described, between the posterior nares and temporo-maxillary fossæ, the malar bones are very much dilated and cellular; the cells communicating with the interior of the maxillary bones. The latter also are not only very much dilated in advance of the malar bones, but between these and the palate bones above the alveoli they extend backward in a cellular cavity, closed behind by the *os unguis*, at least an inch from the last molar tooth.

The foramina at the base of the cranium have the same arrangement and relations as in the Peccary.

The glenoid cavity is a little more antero-posterior in its long diameter than in the latter, and instead of being upon a level at bottom with the *os tympanica* is removed from it obliquely downwards and forwards for nearly an inch by the unusual prolongation in this direction of the zygoma.

The meatus auditorius externus is placed in the same relative position as in the Peccary, and is the extraordinary distance of two and a half inches from the glenoid articulation.

The hiatus anterior to the molars is relatively longer than in the Peccary. Its margin is rounded, and out of it rises a linear ridge proceeding to the back of the canine alveolus. Above it, the face exhibits an obtuse low ridge proceeding from just below the infra-orbital foramen forward, and expanding the whole length of the crescentic ridge of the canine alveolus, so conspicuous a character in the Peccary. The latter ridge at its upper part turns inwards and forwards to the antero-lateral edge of the nares as formed by the intermaxillaries and expands gradually downwards and vanishes upon the incisive alveoli. The notch included by the canine alveolar ridge for the reception of the crown of the lower canine when the jaws are closed, is about one and a fourth inches high, and as wide at bottom as the hiatus between the canine and lateral incisor.

The infra-orbital canal commences immediately above the last molar alveolus. The supra-palatine foramen, as it should be called, instead of spheno-palatine, because the sphenoid bone does not always enter into its composition, is placed above and to the inside of the former, is bounded above by the large cellular dilatation of the posterior nares, and is continuous upwards and outwards with the fissure between the latter and the superior maxillary and lachrymal bones. The posterior palatine canal commences at the bottom of a vertical fissure passing from the last designated foramen downwards between the vertical plate of the palate bone and the tuberosity produced by the last molar alveolus. Its exit upon the surface of the hard palate is near the middle of the hiatus anterior to the molars, a couple of lines within its margin, and is continuous with a groove advancing to the naso-palatine foramina, as in the Peccary.

The relative position of the molars, canines, and incisors, is the same as in the latter.

The true molars of the recent Peccary (Pl. 37, figs. 1-4,) appear to be constructed on the type of the Hog, whereas in the cave head they partake more of the character of the Hippopotamus. In the former the crowns present two pairs of principal, short, conoidal, wrinkled tubercles, with constituent portions of the basal ridge wrinkled and tuberculate. The last lower molar, as in all Pachyderms, has its additional lobe. In the latter the principal lobes are relatively very long, prismoid, not wrinkled, but constricted at the sides, and opposed to one another as in the Hippopotamus, so that when the summits are worn off,

they present a slight trefoil appearance. The basal ridge, where it exists, is more foveate, less wrinkled, and more prominently tuberculate. Indeed, the true molars of the Peccary have the appearance as if they had been cast of some soft substance, in the same mould as those of the cave head, and had become contracted in bulk and wrinkled in drying.

The three superior true molars (Pl. 37, figs. 5, 6,) of the cave head decrease in size from the last to the first; the external lobes are smaller than the internal, and a broad basal ridge surrounds them, open only at the bases internally of the inner lobes, and external part of the base of the antero-external lobe of the last tooth. In the latter, the posterior pair of lobes is shorter than the anterior, and that postero-external is the shortest lobe of those of any of the teeth.

The external lobes are simply conoidal; the inner ones are shaped like those of *Hippopotamus*, or expand anteriorly and posteriorly where they come in contact with the former. In the Peccary and Hog, these expansions are more or less isolated, appearing as accessory wrinkled tubercles. In the cave head the posterior expansion or fold of the antero-internal lobe comes in contact at its lower part with the anterior of the postero-internal lobe, and thus divides the transverse interlobular fissure. The anterior fold of the former lobe and the posterior of the latter divide the basal ridge anteriorly and posteriorly, and are confluent with it.

The basal ridge of the superior true molars anteriorly, is thick, delicately folded, and finely denticulate at the free margin. Posteriorly it has nearly the same appearance, except in the last tooth, where it is much thicker, includes two small foveæ with wrinkled sides, and is divided by a fissure into two unequal tuberculoid portions. Externally in the last tooth the ridge is continuous round the base of the postero-external lobe to the posterior part of the lobe anterior, is thick, folded, and crenulate at margin, and between the lobes includes a fovea containing several minute tubercles. On the other two molars externally the basal ridge is thinnest, and between the lobes includes a fovea with wrinkled sides. Internally in all the upper true molars, constituent folded portions of the basal ridge connect the bases of the inner lobes and enclose foveæ with wrinkled sides.

The inferior true molars (Pl. 37, figs. 7, 8,) have a greater antero-posterior diameter than those corresponding above, but are narrower, and their lobes, also in pairs, are more nearly equal and longer. Constituent portions of the basal ridge exist anteriorly, posteriorly, and between the bases of the lobes externally and internally, where it is, however, relatively feebly developed compared with its condition in the upper molars. The teeth also decrease in size from the last to the first. The lobes are elongated, conoidal, those internal sending a fold backward where they come in contact with the external lobes, and the latter sending a like fold forwards. The anterior fold of the postero-external lobe joins the posterior of the antero-internal lobe. The posterior fold of the postero-internal lobe is relatively very slight to the others.

The basal ridge posteriorly rises into a prominent pyramidal tubercle, most so in the last, where it constitutes the fifth lobe, and least in the first true molar. Between this tubercle and the posterior pair of principal lobes in the last molar, a second and smaller compressed tubercle exists. Anteriorly, the basal ridge is nearly horizontal and denticu-

late. Between the lobes externally it forms a small simple tubercle. Internally, in the same position, it is hardly developed, except in the last molar, where it is also a simple tubercle. In the latter tooth posteriorly on each side of the fifth lobe, it is constituted by a simple tubercle.

The superior deciduous molars preserved in the cave head, (Pl. 37, fig. 17,) regularly decrease in size from the permanent true molars to the first of the former. The third and second superior deciduous molars closely resemble the permanent teeth behind, except that the anterior part of the crown of the second is narrower. The first deciduous molar possesses but a single transverse pair of tubercles, and its crown is trilateral.

From the trituration to which the deciduous teeth have been subjected, trefoil-like tracts of dentine are exposed upon the inner lobes, and simple transverse oval ones upon the summits of the outer lobes. Judging from the wearing of these teeth, the relative length of the lobes of the permanent molars, and the depth of their intervening valleys, the movements of the lower jaw in the animal to which the cave head belonged, were rather more restricted ginglymoid in their character than in *Dicotyles*, but perhaps in a less degree than in *Platygonus*.

In the Peccary the superior premolars (Pl. 37, figs. 1, 2,) still present the same general construction as the true molars. The posterior two present very distinctly the four characteristic wrinkled conoidal lobes, but the postero-internal is reduced in size in the third premolar, and is very feebly developed in the second. The crown of the first is trilateral, and still presents four distinct tubercles, but only one is strikingly prominent.

In the cave head, the three superior permanent premolars, (Pl. 37, figs. 5, 6,) present each a transverse pair of permanent lobes like those of the true molars, surrounded by a basal ridge.

The latter anteriorly and posteriorly is very thick and denticulate at the margin. In the posterior two premolars the hinder portion encloses four small irregular foveæ with wrinkled sides, the anterior portion two similar but larger foveæ. In the first premolar the basal ridge forms a cup with wrinkled sides, from the bottom of which project the two characteristic lobes.

The inferior premolars (Pl. 37, figs. 7, 8,) of the cave head resemble those of the *D. torquatus* (Pl. 37, figs. 3, 4,) with the principal lobes much exaggerated. They decrease successively anteriorly, and are much more nearly equilaterally quadrate than in the Peccary. The posterior two premolars of the fossil are more like the second than the third of the Peccary, but are relatively broader. Each has a transverse pair of principal lobes, very long and shaped like those of the true molars, and bounded behind by a very thick basal ridge rising in an antero-posterior prominence at the middle, and enclosing on each side of the latter a large fovea with wrinkled sides. Anteriorly, also, the basal ridge exists, but is feeble, whether contrasted with the posterior portion or that corresponding to it in the *D. torquatus*. The first premolar is square, or relatively very broad contrasted with that of the Peccary, and the basal ridge forms a cup with wrinkled sides, out of the bottom of which rises a transverse pair of short conoidal lobes.

In *Dicotyles* the exserted portion of the upper unworn canine is enveloped in enamel, ceasing by a sinuous margin at its base and deeply notched anteriorly. The inferior

canines, also, when unworn, are enveloped in enamel, even deeply into the alveoli, except on the posterior concave surface, where a long angular notch extends upwards into the enamel covering. As the animal advances in life, a little after adult age the enamel is completely worn off from the posterior face of the latter tooth, and at a later period the enamelled portion of the tooth becomes completely exserted from the alveolus, the permanently growing dentinal portion alone occupying the latter.

In the cave head we have been particularly engaged in examining, the canine teeth do not differ in construction from those of the existing *Dicotyles*, and their form also is very nearly the same. They are a very little larger than those of *D. torquatus*. The superior canine is compressed to about the same degree as in the former, but it is a little narrower, more convex externally, and to a trifling extent less so internally. The lower canine is relatively more exserted than in either existing species of *Dicotyles*, is convex and smooth internally and externally, and exhibits only a slight disposition to the formation of a ridge at the lower part of the enamelled crown externally.

As before stated, the incisors are not preserved in the cave head, except one (Pl. 37, fig. 19) of those inferior and lateral. This is smaller than in *D. torquatus*, is enclosed within the alveolus, and appears as if it would have always remained concealed. Its crown is simply mammillary, very slightly compressed antero-internally.

Having described this interesting specimen in comparison with the two existing species of *Dicotyles*, we have next to ascertain whether it differs from any of those *Dicotylinæ* whose former existence has been established by Dr. Le Conte.

From the fragment of lower jaw of *Platygonus compressus* the corresponding portion of the cave head differs in its being relatively less deep, and in its angle not being produced so much downwards, and instead of curving outwards, as is so remarkably the case in *Platygonus*, it is nearly vertical. The post-coronoid depression is also considerably less deep. The posterior two molars are a little larger than those remaining in the specimen of *Platygonus*, and in the last molar a large accessory lobe is introduced between the fifth and middle pair of lobes, no trace of which exists in the latter.

A good deal of similarity exists between the fragment of the face of *Platygonus* and the corresponding portion of the cave head. In both they present about the same degree of lateral compression; the acute ridge of the superior maxillary bone proceeding from the malar bone, as in *Dicotyles*, is absent; the crescentic ridge of the canine alveolus has about the same extent and course; and in the same relative position in advance of the malar bone superiorly the upper maxillary bone is protuberant. But in the cave head the face is relatively longer, while its intermaxillaries are broader and very much shorter, being  $2\frac{1}{4}$  inches in length from the lateral notch of the nares, while in *Platygonus* they are one inch longer.

The posterior two premolars have nearly the same form, but the basal ridge is less strong in *Platygonus*, and is not so deeply foveated. The first premolar in the cave head is quadrate, and has two prominent principal lobes like the two posterior premolars, and possesses a strong basal cingulum open for a short space only internally. In *Platygonus*

the first premolar is trilateral, with one principal lobe, and has its basal ridge open externally. The last superior true molar of the cave head is trilateral, with its rounded apex posterior, while in *Platygonus* it is broader, quadrate, has its constituent portions of the basal ridge laterally less developed, and has its postero-external lobe better developed.

Having said enough to prove the cave head is not only specifically but generically distinct from *Platygonus compressus*, we have next to compare it with the specimens referred to *Dicotyles depressifrons*. With this purpose in view, the first thing which strikes us in examining the fragment of skull of the latter is the evident existence of the acute ridge on the side of the superior maxillary bone, proceeding from the inferior margin of the malar bone, as in recent species of *Dicotyles*, but which does not exist in the cave head.

In the fragment of the skull of *Dicotyles depressifrons*, as before stated, the forehead appears to have been longer than broad, as in recent species of the genus, but in the cave head the breadth greatly exceeds the length.

The face is very much broader in *Dicotyles depressifrons* than in the latter, and has probably been shorter, for in the fragment the distance from the upper end of the intermaxillaries to the suture of the nasal process of the superior maxillary bones with the frontal is a little over two inches, while in the cave head from the same points the distance is one and a quarter inches greater.

In *Dicotyles depressifrons* the nasal process of the upper maxillary bone is broader and more rapidly divergent anteriorly than in the cave head. The upper extremity of the intermaxillaries in the former incline  $35^{\circ}$ , while in the latter it is nearly vertical, and the face behind these bones, still sloping in the *Dicotyles depressifrons* to the margin of the maxillo-malar ridge, is vertical in the cave head until it begins to dilate posteriorly.

Other but more trifling differences exist, but it is evident, from the comparison which has been made, that the cave head, without doubt distinct from *Dicotyles*, also evidently could not have belonged to the same animal characterized by the cranial fragment as *Dicotyles depressifrons*.

The only specimen among those referred to *Protochoerus prismaticus* sufficiently characteristic for comparison with the cave head is the fragment of a last upper molar. The first upper true molar of the cave head has about the same size, and if worn down to the same extent would probably have the same appearance as that ascribed to *Protochoerus*, which, however, would also be the case with the much worn tooth of *Dicotyles*. The lower canine also of the cave head, if much worn down, would present about the same size and proportions as that of *Protochoerus*, and this also would be the case with that of the collared Peccary under the same circumstances.

The last upper molar of the cave head is in a trifling degree broader than that of *Protochoerus*, and the postero-external lobe is relatively to the others less developed. The basal ridge in the former posteriorly forms three short tubercles, enclosing as many foveæ, but in the fragment of tooth in the same position forms a prominent lobe, larger than the fifth lobe of the last lower molar of the cave head, and to the antero-external side of this forms another and smaller tubercle, the two enclosing a single fovea.

These characters of comparison which have been presented between the corresponding

last molar tooth of *Protochoerus* and the cave head may be variable in the same species; but of this we must remain in doubt until further discovery of more material: and until further evidence can be brought to prove the cave head belonged to *Protochoerus* it will be at least of advantage in the way of reference to consider the former as distinct, and I therefore propose for the animal to which it belonged the name of *Euchœrus macrops*.

In conclusion, in answer to what may be urged by some naturalists, that the characters given of *Platygonus*, *Protochoerus*, and *Euchœrus* are not sufficient to rank them as distinct genera from *Dicotyles*, I must add that it will be admitted that the recognised species of the latter present characters in common not possessed by any of the preceding genera, and therefore these should be distinct, and among these new genera differences exist, quite as important as those separating them from *Dicotyles*. Those who acknowledge the distinction between *Machairodus* and *Felis*, *Ovibos* and *Bos*, *Acrotherium* and *Rhinoceros*, etc., will readily admit this reasoning, and with such naturalists who are so precise as to consider *Bison*, *Bubalus*, *Bibos*, etc., distinct from *Bos*, or *Alces*, *Tarandus*, *Cariacus*, *Megaceros*, and *Strongyloceros*, etc., from *Cervus*, the matter is beyond dispute.

*Comparative Admeasurements of the head of Dicotyles torquatus, D. labiatus, and Euchœrus macrops.*

|  | D. torquatus.   | D. labiatus.   | E. macrops.     |
|--|-----------------|----------------|-----------------|
| Length of head from occipital condyle to incisive alveoli, -                     | 8 in. 3 lines.  | 9 in. 6 lines. | 11 in. 3 lines. |
| Distance from inion to end of nose, -  | 9 "             | 10 " 3 "       |                 |
| " supra-orbit. foramina to end of nose, -  | 4 " 3 "         | 4 " 9 "        | 4 "             |
| Length of os frontis at middle, -  | - - - - *       |                | 2 " 1 "         |
| Greatest breadth of forehead, -  | - - - - 3 "     | 3 " 5 "        | 4 " 5 "         |
| Breadth at anterior glenoid tubercles, -   | - - - - 4 "     | 4 " 9 "        | 4 " 6 "         |
| " infra-orbital foramina, - - - -  | 1 " 4 "         | 1 " 10 "       | 1 "             |
| Length of face from ant-orbital margin to incisive alveoli, -                    | 5 " 4 "         | 6 " 3 "        | 8 " 6 "         |
| Breadth at canine alveoli, -   | - - - - 2 " 6 " | 2 " 7 "        | 2 " 5 "         |
| " lateral incisors, - - - -  | 1 " 2 "         | 1 " 3 "        | 1 " 4 "         |
| " ossa nasi at ends of intermaxillaries, -                                       |                 |                | 1 " 1 "         |
| Distance between supra-orbital foramina, -                                       | - - - 1 " 1 "   | 11 "           | 1 " 5 "         |
| Height from midway between supra-orbital foramina to level<br>of palate, - - - - | 2 " 10 "        | 3 " 6 "        | 3 " 6 "         |
| Height between canines, - - - -  | 1 " 9 "         | 1 " 9 "        | 2 " ? "         |
| Height of inion, - - - -   | 3 " 6 "         | 3 " 9 "        | 3 " 7 "         |
| Vertical diameter of orbit, - - - -  | 1 " 5 "         | 1 " 7 "        | 1 " 4½ "        |
| Transverse " " - - - -   | 1 " 2 "         | 1 " 2½ "       | 1 " 7 "         |
| Depth of os mala below orbit, - - - -  | 10 "            | 1 " 1 "        | 1 " 8 "         |
| " from end of post-orbital process, -  | 1 " 2 "         | 1 " 5½ "       | 2 " 5 "         |
| From meatus audit. ext. to end of post-glenoid tubercle, -                       | 2 "             | 2 " 6 "        | 3 "             |
| Length of hard palate, - - - -   | 5 " 6 "         | 7 "            | 7 " 9 "         |
| Breadth between first true molars, - - - -                                       | 11 "            | 11 "           | 11 "            |
| Length of upper molar series, - - - -  | 2 " 9 "         | 3 "            | 3 " 1 "         |
| Length of hiatus anterior to molars, - - - -                                     | 7 "             | 1 " 2 "        | 1 " 10 "        |
| " " " to canines, - - - -  | 8 "             | 10 "           | 9 "             |

\* From obliteration of some of the sutures, I am not able to give all the measurements.

|   | D. torquatus.  | D. labiatus.   | E. macrops.     |
|---|----------------|----------------|-----------------|
| Length of lower jaw, - - - - -                | 6 in. 6 lines. | 7 in. 9 lines. | 8 in. 10 lines. |
| Height from coronoid to angle, - - - - -      | 2 " 11 "       | 3 " 9 "        | 3 " 6 "         |
| "    " condyle " " - - - - -                  | 2 " 9 "        | 3 " 3 "        | 3 " 6 "         |
| "    " of body at first true molar, - - - - - | 1 " 4 "        | 1 " 7 "        | 1 " 6 "         |
| Length of symphysis, - - - - -                | 2 " 3 "        | 2 " 4 "        | 2 " 10 "        |
| Distance between coronoids, - - - - -         | 2 "            | 2 " 2 "        | 2 "             |
| "    " angles, - - - - -                      | 1 " 11 "       | 3 "            | 3 " 10 "        |
| Length of lower molar series, - - - - -       | 2 " 10 "       | 3 " 2 "        | 3 " 4 "         |
| "    " hiatus, anterior to molars, - - - - -  | 1 "            | 1 " 4 "        | 2 " 2 "         |

*Admeasurements of the teeth in Euchærus macrops.*

|  |           |           |          |
|--|-----------|-----------|----------|
| Ant. post. diam. sup. post. molar,       | - - - - - | - - - - - | 9 "      |
| Transverse diam. " " " - - - - -         | - - - - - | - - - - - | 6½ "     |
| Height of crown " " " - - - - -          | - - - - - | - - - - - | 6 "      |
| Ant. post. diam. sup. first true molar,  | - - - - - | - - - - - | 6½ "     |
| Transverse " " " " - - - - -             | - - - - - | - - - - - | 5 "      |
| Ant. post. diam. sup. third premolar,    | - - - - - | - - - - - | 4¾ "     |
| Transverse " " " - - - - -               | - - - - - | - - - - - | 5¼ "     |
| Height of crown " " " - - - - -          | - - - - - | - - - - - | 5 "      |
| Ant. post. diam. sup. first premolar,    | - - - - - | - - - - - | 4½ "     |
| Transverse " " " - - - - -               | - - - - - | - - - - - | 4½ "     |
| Height of crown " " " - - - - -          | - - - - - | - - - - - | 3¾ "     |
| Ant. post. diam. inf. post. molar,       | - - - - - | - - - - - | 10 "     |
| Transverse " " " - - - - -               | - - - - - | - - - - - | 5¾ "     |
| Height of crown " " " - - - - -          | - - - - - | - - - - - | 6¾ "     |
| Ant. post. diam. inf. first true molar,  | - - - - - | - - - - - | 6¾ "     |
| Transverse " " " - - - - -               | - - - - - | - - - - - | 4¾ "     |
| Ant. post. diam. inf. third premolar,    | - - - - - | - - - - - | 5 "      |
| Transverse " " " - - - - -               | - - - - - | - - - - - | 4¾ "     |
| Height of crown " " " - - - - -          | - - - - - | - - - - - | 6 "      |
| Ant. post. diam. inf. first premolar,    | - - - - - | - - - - - | 4 "      |
| Transverse " " " - - - - -               | - - - - - | - - - - - | 3¾ "     |
| Height of crown " " " - - - - -          | - - - - - | - - - - - | 3 "      |
| Length of upper canine along convexity,  | - - - - - | - - - - - | 3 "      |
| "    " enamelled portion externally,     | - - - - - | - - - - - | 1 " 3 "  |
| "    " lower canine along convex margin, | - - - - - | - - - - - | 3 " 10 " |
| "    " enamelled portion externally,     | - - - - - | - - - - - | 2 " 7 "  |

The existing and extinct species of Dicotylineæ, so far as investigations have extended, appear to be as follows:—

## EXISTING.

*DICOTYLES TORQUATUS*, *Cuvier*.

*DICOTYLES LABIATUS*, *Cuvier*.

## EXTINCT.

*DICOTYLES*, 5 sp.? *Lund*: Danske naturw. Afh., 1841-2.

**DICOTYLES MAJOR**, *Lund*: Clausen, in neues Jahrbuch für Mineralogie, etc., 1843; Brönn, Index Palæontologicus, Abth. 1, s. 422.

**DICOTYLES DEPRESSIFRONS**, *Le Conte*: Proc. Acad. Nat. Sci., vi. 3.

Probably all the fragments mentioned in the latter communication belong to this animal, except the "four teeth from the upper jaw."

**Hyops depressifrons**, *Lec.*: Am. Journ. Sci., 2d ser., 5, 104; Proc. A. N. S., vi. 57: "a cranium."

**DICOTYLES COSTATUS**, *Le Conte*: Pr. A. N. S., vi. 5.

**PLATYGONUS COMPRESSUS**, *Le Conte*: Am. Jour. Sci., 2d ser., 5, 103; Trans. Am. Acad. Arts and Sci., n. ser., 3, 257. All the specimens represented in the accompanying plates to the latter memoir, I think, belong to this animal.

**Hyops depressifrons**, *Lec.*: Pr. A. N. S., vi. 57: "fragments of anterior part of head with premolars and canines: the entire dental series of upper jaw."

**PROTOCHOERUS PRISMATICUS**, *Le Conte*: Am. Jour. Sci., 20. 5, 105; Pr. A. N. S., vi. 5.

**Hyops depressifrons**, *Le Conte*: Pr. A. N. S., vi. 57: "the canine and two inferior molars of lower jaw."

**EUCHÆRUS (Protochoerus?) MACROPS**, *Leidy*: hoc opera.

#### REFERENCES TO THE PLATES.—PLATE 35.

Represents a view of the left side of the skull of *Euchœrus macrops* two-thirds the size of nature. In the original, the nasal bones are broken, as indicated, and the right intermaxillary only exists; but the latter has been transferred to the left side, being otherwise the best preserved, principally on account of the teeth. The latter visible in the upper jaw, are the canine, the three temporary molars, and the succeeding permanent true molars, the last of which is just commencing to protrude. In the lower jaw are visible a portion of the third permanent premolar ready to protrude, and the succeeding true molars; the last partially only.

#### PLATE 36.

Two views, one-half the natural size of the skull of *Euchœrus macrops*.

Fig. 1.—Upper view. The nasal bones in greater part, and the left intermaxillary are broken away, permitting the ossa turbinata, etc. to be seen.

Fig. 2.—View of the base of the skull. The left side of the upper jaw contains the three temporary molars, and the three permanent true molars. The right side, from which the temporary molars were lost, has exposed in their place the permanent premolars.

#### PLATE 37.

All the figures are of the natural size.

Figs. 1—4.—Molar teeth of the right side of *Dicotyles torquatus*, represented for comparison.

Fig. 1.—View of the triturating surfaces of the upper molars.

Fig. 2.—Outer view of the upper molars.

Fig. 3.—Triturating surfaces of the lower molars.

Fig. 4.—Outer view of the lower molars.

Figs. 5—8.—Right molar teeth of *Euchœrus macrops*. The premolars were still concealed within the jaws, and also the last molar partially, but they have been represented as protruded.

Fig. 5.—Triturating surfaces of the upper molars.

Fig. 6.—Outer view of the upper molars.

Fig. 7.—Triturating surfaces of the upper molars.

Fig. 8.—Outer view of the lower molars.

In Figs. 7, 8, the second premolar has been accidentally reversed from its true position.

Fig. 9.—View of the posterior margin of the right side of the lower jaw of *Platygonus compressus*, exhibiting the extent of curvature of the angle outwardly. Same specimen as fig. 3, pl. 38.

Fig. 10.—The posterior two right inferior molars of *Platygonus compressus* viewed upon the triturating surfaces. From the same specimens as the previous figure and fig. 3, pl. 38.

Fig. 11.—Upper left premolars of *Platygonus compressus* viewed upon the triturating surfaces. The first tooth is broken off at the anterior part. From the same specimen as fig. 2, pl. 38. They are unworn, and had not yet protruded from the jaw.

Figs. 12—15.—Upper molars of *Platygonus compressus*, 12, 13, and 14, 15, from two different individuals; the former very probably belonging to the same individual as figs. 9, 10, and fig. 3, pl. 38.

Fig. 12.—Right upper premolars. The middle tooth in the original has its inner tubercle split to the base, a thin lamina lost from the fissure, and the two portions approached together, so that it appears a little different from that represented by figure 14.

Fig. 13.—Posterior two left upper molars.

Fig. 14.—Middle left upper premolar.

Fig. 15.—First and second left upper true molars.

Fig. 16.—Left canine of *Platygonus compressus*.

Fig. 17.—Temporary molars of the upper left side of *Euchœrus macrops*.

Fig. 18.—Right upper last molar, with its anterior part broken off, of *Protochœrus prismaticus*.

Fig. 19.—Lower lateral incisor of *Euchœrus macrops*.

#### PLATE 38.

Fig. 1.—Represents the fragment half the natural size upon which is established the Dicotyles depressifrons. It exhibits portions of the parietal, frontal, nasal, maxillary, intermaxillary, and malar bones.

Fig. 2.—View of the right side of a portion of the face of the natural size of *Platygonus compressus*. It is the same specimen represented in pls. I., II., of vol. 3, of the *Mem. Am. Acad. Arts and Sci.*, but in this figure the canine alveolus with a portion of the tooth which had been broken off, is reattached. Anterior to the latter, the specimen is obscured by a hard brown mass, apparently consisting of a combination of lime and oxide of iron. Portions of the nasal, intermaxillary, and maxillary bones are seen; and on the left side a portion of the maxillary bone in outline with the three permanent premolars, which had not yet protruded from their alveoli. The latter teeth are represented in figure 11, pl. 37.

Fig. 3.—Portion of the right side of the lower jaw containing the last two molars, the natural size, of an adult individual of *Platygonus compressus*. A fragment of matrix obscures the angle, and another portion is attached in advance of the condyle.